Gravitational, Magnetic, and Other Machines of Perpetual Motion!

Gravitational Motors:

General:

I am told designing machines of perpetual motion with gravity is in some ways more challenging than those based on magnetism as the latter provides two directionally opposite forces (ie positive and negative polarities) to work with while gravity only has buoyancy (a force based on pressure and with that pressure usually but not always based on gravity--eg lead might be buoyant in magnetic ferrofluid powerfully pulled downwards) as an approximation of magnetism's more directly directionally opposing force; a greater challenge, however, is the inability to quickly throttle exposure to gravity as can be done with magnetism via large differences in the sizes of permanent magnets acting upon one another (and perhaps other means such as periods of building tension before overcoming barriers for acceleration through regions of changing polarity and substantial amounts of counterproductive force--eg, as a quick and rough illustration, if the bending object used to stop a "wheel of fortune" wheel had a large magnet near its end, was reciprocated along the pegs magnetically by sections of alternating polarity where the different numbers on the wheel are, had some of the power generated by its reciprocating motion used to turn a crankshaft that--after gear reduction--spun the wheel to the next section with each stroke, and perhaps with functional modifications like a flywheel added, then a motor of fortune might be created). I suspect designs for gravitational motors can be most easily conceived if they only rely on a downstroke rather than cyclical motion by continually exploiting a resource immediately available (eg densifying atmospheric fluids or a hydroelectric dam with a sufficiently dependable water supply). (The buoyancy gravitational motor described below is only able to be powered by gravity--directly on the downstroke and indirectly on the upstroke--because of the work provided by magnets expanding the telescoped tows against pressure.) Motors are more than a convenient substitute for labor--they're toys--and we encourage others to build on these concepts.

Buoyancy Gravitational Motors (B-GM):

Buoyancy gravitational motors utilize buoyancy in a dense fluid for the upstroke and gravity in a light fluid or vacuum for the downstroke with the objects moved by buoyancy and gravity (called "tows") telescoping to a smaller size prior to entering the bottom of the dense fluid column (to limit counterproductive force applied to the tows via pressure) before being telescoped into a larger buoyant size as they rise through a section of permanent magnets. The need to limit counterproductive force

when entering the column of liquid via telescoping along with economical considerations (ie material savings with hollow tows) will bias these motors towards generating power on the upstroke rather than the downstroke. Reduced viscosity (which may incentivize a heated and insulated dense fluid container in some designs) permits tighter spacing between the tows and thus a greater number of power generating tows or--if spacing is maintained--greater tow velocity and thus power.

Buoyancy should be understood as a pressure phenomenon rather than as a sort of reverse gravity (although, practically speaking, for this motor's purposes this is how buoyancy generally functions); ie, objects lighter than the fluid rise due to the fluid's pressure below the object being greater than above. If a normally buoyant object is placed on the bottom of a container with no room for fluid to seep in beneath it, the object will remain pressed against the container's bottom is spite of its lower density as only downward (and sideways) pressure is acting upon it. The relevance of this is to explain the rationale behind having the tows enter the fluid column telescoped to a fraction of their expanded volume; the second major benefit is to allow the tows to pierce through the ferrofluid seal at the bottom of the column that would otherwise have to be designed much wider. After the tows rise a short distance above the ferrofluid seal, they enter the buoyancy generator where the walls of the liquid container taper out (ie widen) and permanent magnets on the outside of the container pull upon and telescope out the tows in both directions to their expanded buoyant position whereupon telescoping internal crossmembers lock into place (with, depending on design, slight battery or cable fed power required to unlock these crossmembers when they are above the liquid chamber). The positive polarity of the magnets on the outside of the buoyancy generator are orientated at an angle inward (ie towards the tows) and down. (The tows will be pulled upwards towards the magnets in the ferrofluid seal section and experience counterproductive force trying to exit this area in an offsetting manner.)

The tows are connected together with 2 cables (1 near each end) into a single assembly and travel along an elongated stadium circuit--somewhat like a vertically orientated ski-lift or gondola--with power transferring from tows, via the cables, to bullwheels or rollers that--via shafts and gears or pulleys--are connected to an electric generator. The bullwheels or rollers need only support the tow and cable assembly at the top and bottom of the circuit. The shape of tows are rectangular with the vertical dimension much smaller than the length and slightly larger than the width. (The width is designated as the dimension that points towards the tows traveling in the opposite direction and this will likely be the smallest dimension to facilitate tight 180 degree turns at the motor's top and bottom). The tows are necessarily ferromagnetic (ie, generally, steel).

In one version, permanent magnets line the bottom outside of the dense fluid container to contain the levitating ferrofluid seal in place. The structure holding the

dense fluid (presumably, on Earth, water densified with salt or perhaps nanoparticles such as lead that are suspended via Brownian motion similar to ferrofluids) might appear--very roughly--dimensionally like a very scaled up version of two pieces of paper facing each other with a gap of a few centimeters between them, the 2 vertical sides sealed together, the top remaining open, and the bottom sealed with ferrofluid. The tows--later expanded magnetically for productive buoyant work--are telescoped inward for their downstroke and through the ferrofluid seal. Due to this, the container is narrower at the bottom before tapering out to a greater width for the longer section above. Beyond the gradually outward tapering "buoyancy generator", the container is significantly longer and wider than the tows to permit a significant mass of fluid required to generate the desired buoyant pressure and thus motor power; if the tows (especially if closely spaced above and below one another) have minimal clearance to the container's walls, they will be displaced by only a small amount of liquid and thus force for the distance that they travel.

As an alternative to the aforementioned ferrofluid seal version (F-B-GM), the bottom of the container would contain a choke (design version C-B-GM) marginally longer and wider than the inward telescoped tows and with a height slightly greater than the distance between 2 tows. A flexible seal (presumably similar to a lip seal) lines the outside of the tows to minimize lost fluid that would need to be replaced or collected and pumped back into the liquid container. In this design, sections of cable would run between tows from 2 places and in the width-wise middle rather than beyond the ends of the tows (as in the F-B-GM design) so as to permit them to pass through the choke and power would directly transfer from the tows pressed upon bullwheels or rollers. Depending on the distance between the tows, the tows entering the column will experience only downward pressure over a greater distance than those in the more efficient F-B-GM version.

(It's now clear to me that the potential for magnetic fluids is greatly underappreciated on Earth. For example, while touring an industrial plant, I was shown a "universal valve" where electromagnets on both sides of permanent magnets inside of piping energize to spread a ferrofluid to an open position at full power and throttle flow at partial power, act as a one-way valve via an instrument that employs pressure heading in the wrong direction to disconnect power to the electromagnets, and--when battery powered with featureless pipe on the outside--is installed inside of pre-existing pipe or with dyed silver solder by spies in enemy spaceships and facilities for remote control; as well, I witnessed an "intersection valve" where a central spherical section of pipe has numerous pipes entering it at various angles, the portion of these pipes inside the sphere flare out with electromagnetic lining the inside, and when activated draw from a magnetic fluid reservoir held in the middle of the sphere with a permanent magnet to allow flow from any one pipe or pipes to travel into the pipe or pipes desired.)

Densified Fluid Gravitational Motors (D-GM):

These motors function by cooling and substantially densifying (if a supercritical fluid such as CO_2) or liquifying (if a fluid such as hydrogen at significant pressure) atmospheric fluids, injecting them into insulated and compressible containers, and allowing them to pull down on a loop of cable running along rollers or a bullwheel attached to floating power stations on planets such as Venus and Jupiter (with the filled containers releasing their fluid content when they reach the bottom of the loop to shed mass for their return to the power station at the top). With supercritical fluids, a small decrease in temperature can--depending on the range for a given substance--dramatically increase density (eg C02 at 50 bar is roughly 10x more dense at 280K vs 400K, ie 10x at ~70% of its initial temperature, and at 90 bar--the pressure near Venus's surface--CO_2 is approximately 5x more dense at these temperatures); this allows a cooler fluid within an insulated and compressible container to rapidly sink down its own column before being discharged. It is also possible for some of these motors to use heated fluid injected into containers at the bottom of the loop for a buoyant upstroke.

Beyond this general insight, our most immediate focus with this motor is specifically to suggest a means for inexpensive power generation on Venus (and later gas giants like Jupiter) with the goal of using this power to manufacture an almost exponentially increasing number of machines of perpetual motion that use their power to disassociate almost all of the atmosphere's CO_2 into oxygen and carbon (for soil, building materials, tanks to hold the newly liberated oxygen until it can be combined with hydrogen for water, etc). Floating ultrahigh surface area towers with thousands of trays lined with a reactive substance could be employed to remove the atmosphere's sulphuric acid content over time. At this point, hydrogen imported or gathered from Venus would be combined with stored oxygen for water and a magnetosphere constructed (via superconducting rings circling the planet) to render the planet habitable. (The civilization I visited informed me that--at a point slightly beyond our stage of development--they used antimatter catalysed nuclear fusion spacetankers to move hydrogen and helium from a gas giant to storage facilities on the gas giant's moons or, at times, deposited the fluids into radiation shielded artificial liquid moons around the source and destination planets.)

For gas giants--given the potential stroke lengths, amount of gravity (especially Jupiter), and that power stations buoyant in hydrogen might be at tens of bars that facilitate immediate liquefaction--there would be a greater emphasis on per stroke power even as further cooling has diminishing returns in increased density for the amount of energy consumed in the refrigeration process. Ultrastrong carbon or other materials with great breaking length will greatly enhance the potential downstroke on gas giant D-GMs. It may be more practical to grant gas giant power stations buoyancy with heated and insulated hydrogen balloons rather than vac or electron balloons (explained later).

Magnetic Motors:

General:

Designs for clean, reliable, and inexpensive electricity for transportation and grid power via permanent magnets continually acting upon each other with the fundamental insight that--unlike electric motors benefiting from an electromagnet's ability to periodically reverse polarity--magnetic motors may require reciprocating action to induce productive rotary motion. While the 3 designs differ greatly, the common themes are a) magnets reciprocate between two outer magnets with those outer magnets having the same polarity facing any single reciprocating magnet, b) the reciprocating magnets turn a shaft that causes them to be exposed to different outer magnets with the opposite inward facing polarity (in the R-MM and T-MM designs) or to reverse the direction that their own poles face the outer magnets (in the C-MM version) near the end of a stroke to permit continuous cycling, and--in the R-MM and T-MM designs--c) the percentage of time reciprocating magnets are significantly exposed to outer magnets of the undesired polarity is minimized by having a large number of small (ie relative to the larger outer magnets) reciprocating magnets with that difference in size resulting in substantial exposure to counterproductive force only experienced near the very beginning and end of a stroke while midstroke the reciprocating magnets effectively slide--at a distance, ie with an air gap, and at a perpendicular direction to their reciprocating direction--along the outer magnets (in a manner similar to a magnetic bearing or a falling fridge magnet--when lacking sufficient friction to resist gravity--as it is attracted to the fridge in all directions almost equally).

Reciprocating Magnetic Motors (R-MM):

I consider this first design to be superior for transportation and--unlike the latter two designs (ie C-MM and T-MM)--has both of its variants (ie one without electromagnets and a potentially more powerful version with both permanent magnets and electromagnets) explained together; the first is designated Permanent Reciprocating Magnetic Motor (P-R-MM); the second--essentially just a P-R-MM with electromagnets fastened to the side of the rotors not facing the reciprocating magnets for discretionary bursts of power--Dual Drive Reciprocating Magnetic Motors (D-R-MM).

The rotors are each composed of two magnets with half circle faces (each with a different polarity facing inwards) fastened together into a thick disk with a hole in the middle to permit the rotor to be directly connected to its designated end of the

straight shaft. The rotors mirror each other with regard to the polarity facing each other and any given reciprocator in between them. As each reciprocator stroke turns the rotors 180 degrees (via crankshaft), the timing between the positions of the reciprocators and the rotors is simply and consistently synced (ie the polarity of the rotors facing a given reciprocator reverses when the reciprocator transitions to a stroke in the opposite direction).

The reciprocators' "housing" spans--with minor clearance--the distance between the two rotors and bears a large number of thin pie slice shaped reciprocating magnets. An end view of the housing has a small hole in the center for the straight shaft to run through and connect the two rotors together and is thus annulus shaped; given this passageway for the shaft in the middle, the end view would appear like a bagel with a small hole cut into tens of pieces with the bagel slices being the end view of the reciprocators inside the housing walls and the spaces in between the slices being thin housing walls that separate them and maintain a pathway for the reciprocators. Slits on the outside of the housing (1 above each reciprocator) are necessary to allow travel of the reciprocators' posts (possibly a T-shaped fitting screwed into the center top of each reciprocator). (Cables running from these posts to the crankshaft being the means to turn the rotors, generally a generator, and sometimes a drive shaft depending on the mag motor's function.) The housing material should be strong and stiff (ie to allow thin walls between the reciprocators thereby permitting thicker reciprocators) with a low friction coating as, in addition to gravity, there will be slight attraction and repulsion with the neighbouring reciprocators (minimized with shorter stroke lengths as the neighbouring reciprocators mostly balance each other's force exerted on the magnet between them).

Regarding the reciprocators, everything else being equal, a given mass of reciprocators should be divided into as many thin reciprocators as possible to limit the amount of time a reciprocator is substantially exposed to the undesired polarity during any given stroke. Another major factor in motor efficiency is the distance the reciprocators travel and thus their gap between the rotors' magnets; additionally, as any given reciprocator near the end of its stroke will productively pull--at an angle--the rotor magnet of opposite polarity on the rotor furthest from the reciprocator, shorter stroke lengths will permit this effect to mostly offset the counterproductive force between a reciprocator and its nearest rotor during these transitional periods. These effects--as well as other benefits such as reduced motor size--will strongly incentivize short strokes and thus further limiting friction for rotors rotating more quickly than would be the case with longer reciprocator strokes. The reciprocators should be coated in a low friction material and placed in the housing in an alternating fashion (ie the neighbouring reciprocators of a given reciprocator should have the opposite polarity facing towards the rotors) to help balance forces on the rotors' bearings. (0.3 cubic meters or a cubic foot of Earth's strongest permanent magnets have a pull force of roughly 60,000kg thus necessitating

balancing of forces on parts when possible as well as great caution and safety protocols regarding assembly).

The shaft system begins on one end with a) a shaft that couples to a transmission (generally only on some transportation motors that both directly drive an vehicle's axel and power a generator), b) a straight shaft directly connecting to a rotor before running through a long hole in the center of the reciprocators' housing to the other rotor it directly attaches to, c) possibly a coupler between the straight shaft and the following crankshaft to allow the shafts to disconnect and halt the motor in emergency, d) a crankshaft that numerous reciprocator cables attach to, e) a means of stopping the motor (possibly, given the low RPMs, with great hydraulic pressure on a large high friction disk--also functioning as a flywheel although the heavy rotors fulfill this function--that is subsequently mechanically locked), f) a redundant means of stopping the motor, g) possibly--in some vehicles--gearing with 2 90 degree bends that allows the subsequent gearbox to sit beside the crankshaft and the generator/motor that follows the gearbox to sit beside the mag motor, h) a gearbox or other means of RPM conversion, and i) a connection to the dedicated generator or generator/motor's shaft (with the later used for transportation versions that charge supercapacitors and possibly batteries to later consume charge as a motor during high demand--ie, generally, substantial acceleration--as well as provides grid electricity while parked).

The motor stand supports a bearing around each rotor (due to their weight and efficient design designating all room between the rotors for the reciprocators' housing), bearing(s) beyond the crankshaft, each end of the bottom of the housing (leaving room in the middle for reciprocator posts to travel), and possibly for a dedicated generator or generator/motor. Numerous holes are required on one side of the motor stand section that bears the housing to permit travel of cables running to the crankshaft (only for cables running from reciprocators near the bottom of the housing to the crankshaft).

Regarding the cable system (roughly speaking as rope may be preferable), each reciprocator connects to the crankshaft via rope that runs from the reciprocator's post in both directions to two crankpins; the rope that initially runs from the post towards the crankshaft takes a 90 degree turn around a roller to the crankpin beneath it while the rope initially running away from the crankshaft (starting from the post) takes a 180 degree turn around a roller above the end of the housing furthest from the crankshaft before also taking a 90 degree turn on a roller above the appropriate crankpin (the purpose of this is to permit strokes in both directions to pull on a single crankshaft). These rollers much be supported by a framework rising on both sides of the motor stand or some other structure. Unfortunately--as efficiency requires a large number of reciprocators and with each of them experiencing a different stroke position--there may need to be twice as many crankpins as there are reciprocators (this can, and likely generally will, be reduced in half by using an even number of

reciprocators as those on the opposite side of the housing will reverse at the same time--while traveling in opposite directions--and two ropes can attach to the same crankpin); this will incentivize exotic crankshaft materials and strong (ie thin) rope like UHMWPE to reduce crankshaft size. The rope must be reasonably elastic and fatigue resistant to a) store energy when a reciprocator is transitioning direction to later expend that energy accelerating the reciprocator as it begins its next stroke, b) reduce shock on the crankpins (as the crankshaft will not significantly budge for any single reciprocator reversing) and thus permit smaller crankpin size, c) lessen reciprocator demagnetization from jarring motion if it might be an issue, and d) account for slight increases in length (~1%) as more rope is needed mid-stroke due to lateral crankpin positions as well as neighbouring reciprocators generating both a beneficial and counterproductive push on a reciprocator during different halves of a stroke. If the RPMs are sufficiently low and rope with both low friction and high wear resistance like UHMWPE is used, a low friction bushing between the rope and crankpins may be preferable to bearings.

These motors permit the design of a low cost, durable, and unlimited range electromagnetic car that can generate grid electricity when parked (with appropriate infrastructure) called a "magnetic car". Magnetic cars possess a mag motor and a generator or generator/motor where throttled generator load (charging supercapacitors and possibly batteries) limits the mag motor's power output that is transferred to the axel(s) to control vehicle speed while still productively harnessing the mag motor's output; a transmission with high gear reduction permits the car to creep at full power to the drive shaft (if the power storage devices are fully charged and there is no generator load) and a transmission shaft disconnects to stop the vehicle when needed (as the mag motor continuously runs at full power). As large energy storage is no longer a concern while increased power output for periods of high demand remains useful, batteries might be largely or entirely replaced with a generally smaller volume of supercapacitors. When high power output is desired, the generator/motor assumes the role of a motor and pairs with the mag motor to power the drive shaft. Extreme bursts of speed are accomplished via D-R-MMs (dual drive mag motors) with a hypercharged mag motor being one that is powered only by batteries, an ultracharged version using supercapacitors as well, and a warpcharged variant employing a continuous supply of electricity from nearby infrastructure. Beyond the challenges of lethal g-forces for humans and cyborgs unable to body swap (ie where a cyborg leaves its body outside of the vehicle, uploads into its warpcharged mag motor/antimatter rocket spacecar, and enters a new body at its destination), extreme force on engine parts, and tremendous cooling requirements for D-R-MMs not solely utilizing superconducting electromagnets, a need for greatly enhanced grip may necessitate magnetic tracks with powerful electromagnets generally positioned behind retractable high friction material (ie rubber on Earth).

Circuitous Magnetic Motor (C-MM):

In this design a large number of small "circuit magnets" essentially reciprocate between two large stationary "end magnets" along an elongated stadium circuit. The circuit magnets are similar in dimension to B-GM tows (ie length >> height > width) and part of a cable and magnet assembly that powers rollers or bullwheels similar to the cable and tow assembly of B-GMs.

The end magnets--similar in function to the outer magnets in all mag motors--have the same polarity facing the circuit magnets and a rectangular or square face directed towards the circuit or circuits (a circuit being an assembly of circuit magnets and the cables that fasten them together). Numerous circuits can be placed closely beside each other between these end magnets as the cables are necessarily taut to permit power transfer and the lateral attraction (ie along with width dimension of circuit magnets) upon a given circuit magnet will be balanced by the circuit magnets on either side exposing the same polarity to the circuit magnet in the middle (although circuit magnets on the outside may require slightly more space).

The benefit of employing this cable system--besides providing a medium to transfer power--is to maintain a steady speed for the circuit magnets to prevent energy from being extracted from the motor due to wasteful acceleration and deceleration (as would occur with a system attempting to reciprocate a long magnet between two stationary magnets that somehow slowed, rotated 180 degrees, and accelerated the reciprocating magnet whenever it needed to change direction); additionally, the few circuit magnets reversing direction at the top and bottom are powered through these slightly energy consuming turns by a cable powered by numerous other circuit magnets in their much longer productive phase.

Cable material selection and, presumably more relevantly, the strength (for lessened diameter) and flexibility of a circuit magnet's connections to its cables will aid tighter turns with the goal of having the rollers at the end of a loop roughly equal in diameter to the width of the magnets to allow circuit magnets on their downstroke to be almost in contact with those on their upstroke (to maximize the motor's power density).

Miniature C-MMs might be the preferred mag motor for self-charging cell phones, laptops, air quality monitors affixed to masks, ventilation systems, etc that detect pathogens and broadcast alerts, and other devices given their greater power density than T-MMs as well as greater simplicity and possibly durability compared to R-MMs; however, precautions are needed to restrict the proliferation and use of small or even microscopic mag motor AI robots with the potential to kill billions via continuous burrowing, poisoning, infecting, etc.

Train Magnetic Motor (T-MM):

This motor features a more mechanically straightforward design than the R-MMs with a characteristically alien perspective. T-MMs feature vehicles that continuously travel around a circuit via a small amount of the power generated by vertically orientated reciprocators turning a crankshaft that turns wheels to propel the magnetic locomotives to the next section of track which features magnets of opposite polarity below and usually above the locomotives; at this point, the locomotive's reciprocators reverse direction and are propelled to the next section of track in a continuously repeating cycle. These magnetic locomotives are linked together into a magnetic train that spans the entire circuit. The remaining and likely vast majority of the power generated (ie power not consumed moving the train forward) is used to pull a cable attached to the locomotives and positioned above or beside the tracks that is run through rollers that eventually power a generator.

The track is composed of alternating sections of permanent magnets that periodically reverse the polarity exposed to the reciprocators with the length of track per section equal to the locomotive's forward motion generated per reciprocator stroke. Timing can be maintained with a notch or protrusion on the track with a corresponding notch or protrusion on 2 of the locomotive's wheels; if greater traction is needed, the wheels can be magnetized and/or replaced with gears. A track is only required below; however, it will generally be desired to place a track above as well as this more than doubles the power output (given the static cost of moving the train forward) at roughly only 50% more mass of permanent magnets (taking into account the magnets in both the tracks and locomotives) in addition to--assuming power plant output being the same--decreasing the footprint of the facility.

Crankpin positioning is determined by the need to facilitate a particular reciprocator ending its stroke where two sections of track transition. (During this slight sticking point, inertia and other reciprocators in their midstroke positions power the locomotive forward.) To maximize space between the tracks for the reciprocators, bars should extend from the sides of the reciprocators (ie towards the inside or outside of the track) with pivoting bars running from the crankpins to the roughly perpendicular aforementioned bars attached to the sides of the reciprocators.

Efficiency relies on the length of the reciprocators (considered the dimension in line with the side of the tracks) being much smaller than a section of track magnet(s)--ie magnets with the same polarity--as well as the stroke being short to minimize the gap between the track magnets. (The reciprocators' width is usually equal to the track's width.)

A T-MM variant with greater power density possesses pie shaped reciprocators that approach the center of the ring on their smallest side. The reciprocators attach to a ring around and itself connected to a shaft in the center of the track via a shaft fixed to the reciprocators that can slide up and down the ring while it spins the ring.

In spite of what the motor's name might suggest to a human audience, this may be the ideal mag motor for grid power (as it is relatively rugged and mechanically simple) and worst for transportation (given the large layout); however, grid power supplied by parked magnetic vehicles may greatly reduce the need for new power plants.

Celestial Motors:

General:

The following designs employ planets, moons, and asteroids to generate extreme amounts of electricity.

These motors power "satellite electric generators (SEG)" which are composed of a massive "spool generator" atop a colossal "planetary generator"; the planetary generator's housing is attached to a planet or moon and its shaft is attached to the spool generator's housing while the spool generator's generator (which sits above the spool) has its housing attached to the spool's frame and its shaft attached to the spool's reel. The planetary generator converts the rotary motion of heavenly bodies (ie both satellites orbiting a planet and the rotation of that planet) into electricity while the spool generator converts some of the momentum of moons or asteroids distancing themselves from the planet into power. A sufficient amount of tension must be engineered into or onto the spool's reel for the cable to remain taut and to automatically retract when the moon or asteroid is approaching the planet.

Asteroid Celestial Motors (A-CM):

This motor generates electricity by accelerating asteroids (attached via cable to a planet's SEG) with gravity assisted maneuvers before converting gained momentum into ultrahigh torque SEG rotation.

Slingshotting maneuvers include close approaches with the body hosting the SEG, allowing an asteroid to almost scrape the atmosphere of a gas giant before locking the cable if the SEG is on a moon, and juggling several asteroids by periodically releasing each of them to pass around a star or planet.

Controlling the trajectory can be aided by altering the times and total time the asteroid is forcefully turning generators by reducing generator loads, locking the cable into place at times, using intermediate SEGs on other bodies to redirect an asteroid to its destination SEG, positioning smaller asteroids to redirect an asteroids path via controlled collision, and robots that live on asteroids that convert asteroid

material into explosives and rocket fuel as well as help connect cables. The possibilities are endless and an array of advanced A-CMs may require AI management.

Planet and Moon Celestial Motors (P-CM):

A large SEG is fastened to a rocky planet (possibly with large stakes buried in the mantle) and connected by cable to a stake buried deep in the moon via thick ultrastrong cable. (If the moon is not tidally locked, a magnetic bearing must be constructed around it or a design is required that allows the looping cable to periodically slip over the top of the moon.)

Regarding a P-CM on Earth, given the amount of momentum involved and the pace of technological development, I feel there is little cause for concern regarding irreparable global slowing or the Moon spiraling into Earth; however, if society deems this unacceptable, a celestial motor could be constructed around Jupiter (J-P-CM) where a halo (ie a ring built in orbit around a planet or moon and upon completion is usually but not always slowed to geosynchronous velocity) perpendicular to the planet's rapidly rotating equator is spun via plates extending beneath the surface and 2 SEGs (1 above each pole) attach to a moon.

Further into the future, colossal antimatter rockets fastened to these celestial bodies can establish or re-establish desired velocity (previously converted into electricity); at that point, generator load can be increased to efficiently turn rocket output into extreme amounts of electricity.

(On a tangent, the scale of these motors reminds me of how, during my travels, some of the engineers I spoke with argued that the universe expanded and contracted cyclically and that what we refer to as the big bang and dark energy (called "cosmic ignition" and "universal pressure relief" respectively by my host) are indicative that the universe itself might be a motor and the reason our universe is expanding at an increasing rate is that whatever our universe is pushing against is gaining momentum. In particular, they reason that it is exceedingly unlikely that we would exist in the first 15 billion years of a universe without end and only ~0.1% into the epoch that starlight is projected to endure (if current trends persist) given the viable alternatives; put another way, being able to observe motor motion during a powerful phase that would (to an observer unable to view the entire machine) have the appearance of being able to gradually diminish in energy over a much longer time than already elapsed (only to be later acted upon by another force) is consistent with cyclical motor design while if the universe expanded forever the observer would be most likely to find itself somewhere after the edge of livable conditions. Admittedly feeling clever, I suggested that they might have confirmation bias only to be told that their cyborg implants automatically compel them to assume a proposition to be first

true and then false before accepting the best argument produced; I can't help but wonder, however, if they might be misled by a tendency to view God in their image similar to their criticism of our view that God might be a divine carpenter or a computer programmer making simulations.)

Capillarity Motors:

Gravitational and Magnetic Capillarity Motors (G-CapM and M-CapM):

These motors use adhesion (of liquid to its containers) to drive liquid upwards (roughly speaking as magnetic versions of these motors that utilize ferrofluids can be used in space) while breaking cohesion at the top of candy cane shaped tubes to permit the liquid at the discharge ends to change from a concave to convex shape until a droplet grows large enough that 3D forces (ie gravity and/or magnetism) overpower cohesion and fluid discharges at a height greater than where it was siphoned from. (If you twist a small piece of paper towel into a candy cane shape, tear it in half at the top, press the two parts back together, and then submerge the long (ie siphon) end in water, water will eventually travel through the composite structure; after removing the siphon end from water, water will drip from the longer end unless cohesion is broken by separating the two parts whereupon water will also drip from the short (ie discharge) end at a greater height than the water source.) The force that is predominantly responsible for generating power and maintaining fluid height when cohesion is severed at the top is adhesion due in part to increased gravity and magnetism producing the trade-off of a weaker upstroke with a stronger downstroke and thus motor power is largely if not mostly governed by maximizing surface area-to-volume (ie extremely narrow tubes or extremely small pores are essential). (An exception to this would be M-CapMs with attractive magnets on both ends of the siphon tube and a repulsive magnet above the discharge tube in addition to an attractive magnet below the discharge tube--however the addition of more magnets as well as a longer horizontal section running between the tops of the two vertical sections is then necessary thus requiring more space.) Minimizing cohesion (ie attraction of the fluid's molecules to each other) may at least slightly increase motor output; however, as the discharge side after its first discharge may have its capillaries lined with fluid (as it is presumably the fluid between the fluid adhering to the container that drips during discharge), the rate that the capillaries refill with fluid on subsequent discharges might be limited by cohesive force if too low. In a similar way to how Brownian motion can overpower magnetism in ferrofluids to keep magnetic nanoparticles suspended (ie because the particles possess sufficiently high surface area-to-volume), 2D forces can be very powerful if economically exploitable (more practically in the future with improved manufacturing technology permitting greater miniaturization of parts); however, discharge speed is dependent on 3D forces and, again, an increase in those forces has the trade-off of reduced

siphon velocity. It should be noted, 3D surfacing effects can have a major influence on fluid velocity (both direction and speed).

Cohesion near the top would be severed with miniature gate valves closing through a bundle of tubes; in designs using a porous material like zeolites or aerogels, a small section of this material would reciprocate or rotate out of the path between the siphon and discharge ends.

The discharge tubes would be closely spaced and, if circular rather than rectangular, the space between the tubes would function to siphon and discharge as well; though likely more difficult to manufacture, there is also the option of a nesting doll arrangement with one tube inside of the next larger one. The discharge ends benefit from being ground or laser sharpened to fine edges that allow fluid from adjacent tubes to more rapidly link and form droplets. A heated and insulated design that limits the cohesive force of the employed fluid to a minimum will allow smaller droplets to separate (and lower energy consumed breaking cohesion at the top). There is the option of a group of discharge tubes emptying into a column that presses upon a turbine or ejecting their fluid into a shared receiving vessel/siphon reservoir where in a repeating fashion the fluid is continually raised until at last discharged into a tall column above a turbine. It may be desired to increase the mass of the fluid on the discharge side without extending the downward distance (via expanded tubes, spiraling designs, etc) to allow the fluid at the top to be severed with minimal applied force (ie to permit a 3D force pulling down on both sides to mostly break the bonds).

Capillarity motors utilizing permanent magnets at the base enable a more powerful discharge force--with possible exception to G-CapMs used at ultramassive black hole power plants (these power plants are explained later and sometimes employ motors that use frictionless cryogenic helium as a fluid); however, the chemistry involved in the ferrofluid (ie the inclusion of magnetic solids occupying a tiny amount of the tubing's surface and, possibility, the necessity of a non-ideal fluid to act as a carrier for the magnetic particles) may significantly reduce adhesive force and thus power. Finally, MCap-Ms' potential might be greatest in low gravity environments with limited alternative energy sources where the greater costs involved with designs employing magnets is sensible.

Geothermal Motors:

Mantle Geothermal Motor (M-GeoM):

While superior energy sources such as nuclear fusion and challenges complying with Galactic Alliance articles pertinent to the rights of indigenous subterranean peoples

have largely rendered geothermal motors obsolete, I've included the following for interest and informative purposes. (Fusion power is predominantly generated in our galaxy by pumping feedwater laced with hydrogen bombs into colossal spaceboilers that power lasers directed at orbital receivers and moons without atmospheres that are tethered to planets with electrically conductive cables and that also sometimes function as artificial suns that illuminate thousands of artificial planets in artificial solar systems.)

In this design, a long pipe shaped boiler made of a high strength-to-weight and thermally conductive material (such as epoxy-free ultrastrong carbon--like graphene or carbon nanotubes) is filled with water and descends down an insulated pipe into the Earth's mantle at an ocean spreading location (where tectonic plates separate and high temperature rock is relatively close to the surface). During the boiler's descent, it pulls on a cable attached to a spool which rotates a shaft in the middle of the spool (ie a spool generator); the spool's shaft turns intermediate shafts geared to the appropriate RPMs for its generator and thus the desired form of electricity. At the bottom of the pipe, a means to rapidly conduct heat into the boiler extends from the boiler to the pipe it is traveling within to permit the generation of steam at the desired pressure and temperature before being discharged to rise to a turbine at ocean level.

(While often difficult to sensibly construct as a machine of perpetual motion, a lava geothermal motor using a carbon boiler (which sublimates at 3640 degrees Celsius) and high melting point corrosion resistant linings that is filled with water or liquid atmosphere would be submerged into a lava lake--more common on some other planets and moons--where temperatures of lava are (on Earth) around 1200 degrees Celsius.)

Wind Motors:

Antarctic Wind Motor (A-WM):

Wind power generation is simply the attempt to convert motion already present in the atmosphere into rotary power while spending as little money as possible. In an effort to reach higher and typically much stronger winds (with 4x as much kinetic energy for every 2x increase in speed), the construction of giant windmills encounters a major trade-off of trying to harvest a force that acts upon surface area (rather than mass or volume) with large machines that have increased volume-to-surface area ratios (ie material costs relative to surface area available to generate power). More economically damaging, however, windmills on Earth are foolishly constructed out of metal instead of water.

Surface area-to-volume can be improved with vertical axis wind turbines (VAWT) of an elongated cylindrical shape that are assembled together to form a wall-like shape where overlapping and counter-rotating (ie relative to an individual VAWTs immediate neighbours) turbines connect on their ends to shared belts (each belt connects every second turbine) which eventually turn a generator. Half of the area in front of this VAWT assembly is covered with deflectors that redirect air away from the turbine blades spinning towards the incoming wind and towards the blades capable of productive work. While airships with a platform for wind turbines (that enter jet streams before dropping their electrically conductive anchor) have been used with some success on other planets, for Earth the ideal location would likely be on ground and as close to the coast of Antarctica as possible (ie where temperatures remain below freezing year-round) as this location features extreme winds, no trees acting as windbreaks that partially incentivize the tall (ie costly) towers on conventional designs, and most parts can be formed out of ice (via water pumped into molds) for economy. Some of the power generated would be stored in nearby batteries that spin the turbines during periods of uncommonly low wind speeds to ensure perpetual motion; the remaining power would be transmitted via cables laid on the ocean floor.

File: GA-TI915080851-3-1
Uploaded: Dec. 5, '21